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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,442	10/12/2000	Loren T. Lancaster	NVX-0015C1	7388

7590 11/07/2003  
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EXAMINER

BROPHY, JAMIE LYNN

ART UNIT PAPER NUMBER

2822

DATE MAILED: 11/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.



**Office Action Summary**

Applicati n N .

09/689,442

Applicant(s)

LANCASTER, LOREN T.

Examiner

J. L. Brophy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 49-69 is/are pending in the application.
- 4a) Of the above claim(s) 60-69 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 49-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.



### DETAILED ACTION

This office action is in response to the amendment filed 9/15/03.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 49-58 are rejected under 35 U.S.C. 102(b) as being anticipated by Egawa et al (5,436,481).

Egawa et al teach a method that comprises forming a multilayer gate dielectric 36 having a charge storage layer 34 and being dielectrically equivalent to a layer of silicon dioxide having a thickness that is less than 200 angstroms (col. 5, line 67 through col. 6, line 8);

Forming a gate 37 comprising polycrystalline silicon of a first conductivity type on said gate dielectric 36; and

Forming source and drain regions 38 separated by a channel region in a semiconductor substrate 32, said source and drain regions 38 having a second conductivity type different from the first conductivity type (col. 1, lines 63-67),

Wherein forming the multilayer gate dielectric includes forming a bottom dielectric 33, the charge storage layer 34 over the bottom dielectric 33, and a top dielectric 35 over the charge storage layer 34,



Wherein the bottom dielectric 33 and the top dielectric 35 comprise a thermally grown layer of silicon dioxide (col. 5, line 67 through col. 6, line 8),

Wherein the charge storage layer 34 comprises silicon nitride, and

Wherein the gate is n-type or p-type and the source and drain regions are n-type or p-type (col. 6, lines 20-22).

See, for example, Fig. 5 and accompanying text.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Egawa et al.

Egawa et al teach a method that comprises forming a transistor with a multiplayer gate dielectric as applied to claims 49-58 above. However, Egawa et al do not specifically teach the dopant concentration of the gate.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to optimize and select an appropriate dopant concentration for the gate. The selection of parameters such as energy, power, concentration, temperature, time, depth, thickness, etc., would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to



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be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from results of prior art...such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality...More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 105 USPQ 233, 235 (CCPA 1955). See also MPEP 2144.05.

### ***Response to Arguments***

Applicant's arguments filed 9/15/03 have been fully considered but they are not persuasive.

Applicant argues (bottom of p. 7 of arguments filed 9/15/03) that Egawa et al do not teach a gate electrode having different conductivity type than the corresponding source and drain regions. However, as clearly pointed out in the above rejection, Egawa et al teach (at col. 1, lines 63-67) that it is beneficial to introduce P-type impurities into the polycrystalline Si film serving as the gate electrode of a P-channel MOS transistor (in other words, the transistor has a P-type channel, N-type source and drain regions and P-type silicon as the gate electrode) in order to suppress short channel effects. Therefore, applicant's argument that Egawa et al do not teach a gate



electrode having different conductivity type than the corresponding source and drain regions is not found persuasive.

In the Egawa et al reference, the second embodiment (Fig. 5), teaches that the transistor may be N-channel or P-channel, but does not specifically teach the conductivity type of the gate electrode. Egawa et al do teach a preferred embodiment wherein the gate electrode has different conductivity type than the corresponding source and drain regions (at col. 1, lines 63-67). One problem with this preferred embodiment is low transconductance. The gate insulating film of the second embodiment is used to overcome this problem. Therefore, in absence of any specific teaching to the contrary, the second embodiment of Egawa et al comprises a gate electrode with different conductivity type than the corresponding source and drain regions.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. L. Brophy whose telephone number is (703) 308-6182. The examiner can normally be reached on M-F (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

J.L.B.

jlb

  
**AMIR ZARABIAN**  
**SUPERVISORY PATENT EXAMINER**  
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